



# User's Guide



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**Only models HH-25KF, and HH-25KC  
have CE certification.**

## **HH-25 and HH-26 Digital Thermometers**

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It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

**WARNING:** These products are not designed for use in, and should not be used for, patient connected applications.

# TABLE OF CONTENTS

Specifications .....	2
Manual Addenda .....	2
Unpacking and Inspection .....	3
Preparation for Use .....	3
Operation .....	3
Environmental Conditions .....	4
Safety Symbols and Terms .....	4
Safety Precautions .....	4
Maintenance Information .....	4
Functionality.....	4
Performance Verification .....	4, 5
Battery Installation/Replacement .....	5
Calibration Procedure .....	6, 7
Calibration Adjustment Table .....	8

# SPECIFICATIONS

OMEGA MODEL	T.C. TYPE1	RANGE	TEMPERATURE SPAN	RESOLUTION	ACCURACY2 (18° to 28°C; 1 year)
HH-25KF	K	200°F 2000°F	-40.0° to 199.9°F -120° to 1999°F	0.1° 1°	$\pm(0.5\% + 1.0^\circ\text{F})$ $\pm(1\% + 2^\circ\text{F})$
HH-25KC	K	200°C 1100°C	-40.0° to 199.9°C -85° to 1100°C	0.1° 1°	$\pm(0.5\% + 0.5^\circ\text{C})$ $\pm(1\% + 1^\circ\text{C})$
HH-25TF	T	200°F 752°F	-112.0° to 199.9°F 200° to 752°F	0.1° 1°	$\pm(0.4\% + 1.1^\circ\text{F})$ $\pm(1\% + 2^\circ\text{F})$
HH-25TC	T	200°C 400°C	-80.0° to 199.9°C 200° to 400°C	0.1° 1°	$\pm(0.4\% + 0.6^\circ\text{C})$ $\pm(1\% + 1^\circ\text{C})$
HH-26K	K	°F °C	-120° to 1999°F -85° to 1100°C	1° 1°	$\pm(1\% + 2^\circ\text{F})$ $\pm(1\% + 1^\circ\text{C})$
HH-26J	J	°F °C	-112° to 1400°F -80° to 760°C	1° 1°	$\pm(1\% + 2^\circ\text{F})$ $\pm(1\% + 1^\circ\text{C})$

## GENERAL SPECIFICATIONS

**INPUT CURRENT:**  $\leq 1$  microamp, typical.

**REPEATABILITY:** 0.3°F (0.2°C) typical for 1 week at constant ambient temperature.

**TEMPERATURE COEFFICIENT:** 18° to 28°C; included in accuracy specification. From -10° to 18°, and 28° to 50°C; less than  $\pm(0.025\%$  of rdg + 0.1°C)/°C.

**ENVIRONMENTAL LIMITS FOR OPERATING:** -10° to 50°C, less than 80% relative humidity (R.H.) up to 35°C; reduce R.H. limit by 3%/°C from 35° to 50°C.

**ENVIRONMENTAL LIMITS FOR STORAGE:** -35° to 60°C, less than 90% relative humidity up to 35°C, reduce R.H. limit by 3%/°C from 35° to 60°C.

**DISPLAY:** 3½ digit LCD, 13mm (0.5") height. Polarity indication. Decimal point when req'd.

**CONVERSION RATE:** 1.3 readings per second.

**OVERRANGE AND OPEN SENSOR INDICATION:** 3 least significant digits blanked.

**MAXIMUM COMMON MODE VOLTAGE:** 42V peak to earth.

**THERMOCOUPLE INPUT:** Miniature TC connector.

**POWER:** 9V alkaline or carbon-zinc (NEDA 1604) battery.

**BATTERY LIFE, CONTINUOUS:** 350 hours typical with alkaline; 200 hours typical with carbon-zinc.

**BATTERY INDICATOR:** Display indicates "LO BAT" when less than 10% of life remains.

**DIMENSIONS:** 160mm long x 69mm wide x 31mm thick (6.3" x 2.7" x 1.2").

Net weight 210gm (7.5 oz.)

**CONSTRUCTION:** Heavy duty ABS plastic housing.

**ACCESSORIES SUPPLIED:** Battery and Instruction Manual.

Specifications subject to change without notice.

Type K=NiCr-NiAl Thermocouple, Type T=Cu-CuNi Thermocouple, Type J=Fe-CuNi Thermocouple.

Excludes thermocouple sensor errors.

## MANUAL ADDENDA

Improvements or changes to this manual will be explained on an addendum included with the instrument. All change information should be incorporated immediately into the appropriate places in the manual.

# UNPACKING AND INSPECTION

The thermometer is inspected both mechanically and electrically before shipment. Upon receiving the instrument unpack all items from the shipping container and check for any obvious damage that may have occurred during transit. Report any damage to the shipping agent Retain and use the original packing materials if reshipment is necessary

## PREPARATION FOR USE

The thermometer is supplied with a 9 volt battery (See page 5 of this manual for battery installation instructions). Connect the appropriate probe to the miniature TC connector located on the top of the instrument (just above the display).

## OPERATION

The digital thermometer is easy to use. There is only one control (located on the side of the instrument) that turns the instrument on/off and selects the range. Use the following procedure to operate the instrument:

1. Select the appropriate temperature probe and insert it into the miniature TC-input connector, located on the top of the instrument.
2. Turn on the power to the instrument by selecting the desired range.  
Note: For the best accuracy always use the low range when measuring temperatures within the span of the low range.
3. Make the measurement:
  - A. Touch the probe tip to the material to be measured.
  - B. Read the display.

### NOTE

An open sensor or overrange condition is indicated by the following display.

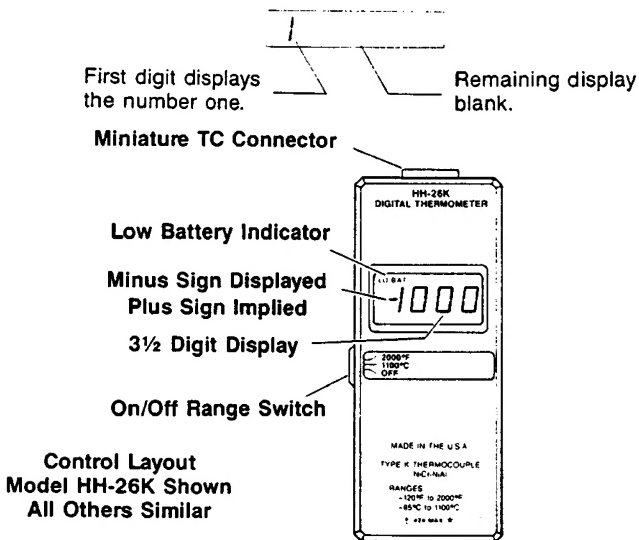



Figure 1.

# ENVIRONMENTAL CONDITIONS

Operation of the thermometer should take place at an ambient temperature of  $-10^{\circ}\text{C}$  to  $50^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $122^{\circ}\text{F}$ ), less than 80% relative humidity up to  $35^{\circ}\text{C}$ , reduce R.H. limit by 3% per  $^{\circ}\text{C}$  from  $35^{\circ}\text{C}$  to  $50^{\circ}\text{C}$ .

## SAFETY SYMBOLS AND TERMS

The symbol  on the instrument denotes that the user should refer to the operating instructions.

The **WARNING** used in this manual explains dangers that could result in personal injury or death.

The **CAUTION** used in this manual explains hazards that could damage the instrument.

## SAFETY PRECAUTIONS

1. Do not touch the probe tip when measuring excessively high or low temperature.
2. Do not exceed 42V peak from the probe tip or input jack to earth ground.

### WARNING

**A shock hazard exists on the thermometer input jacks when probes or sensors are exposed to voltage levels greater than 42V peak to earth ground.**

### CAUTION

**Do not attempt to measure temperatures beyond the range of the probe being used. Probe damage may occur.**

## MAINTENANCE INFORMATION

This section contains information needed to maintain the thermometer. The following information is included: functional check, performance verification, and battery installation/replacement.

### WARNING

**The information presented in this section is intended for use by qualified personnel only. Turn off the power and remove all probes from the instrument before replacing the battery.**

## FUNCTIONALITY CHECK

At room temperature hold the tip of a probe sensor between your thumb and index finger. A reading between  $25^{\circ}\text{C}$  and  $40^{\circ}\text{C}$  ( $77^{\circ}\text{F}$  and  $104^{\circ}\text{F}$ ) should be observed to confirm functionality of the instrument.

## PERFORMANCE VERIFICATION

### Accuracy Check

The instrument should be at an ambient temperature of  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$  and a relative humidity of less than 80% during accuracy check.

1. Prepare a pure water ice bath as follows:
  - A. Drill a hole in the cap of a Dewar flask or thermos to accommodate a thermocouple.
  - B. Firmly pack the flask with pea-size ice cubes made from distilled water and then fill the flask with distilled water.
  - C. Replace the melted ice with more ice while removing the excess water
  - D. Place the cap on the flask.
2. Connect a TC probe to the input jack of the instrument.
3. Immerse the TC probe into the pure water ice bath and allow 10 minutes for thermal stabilization.
4. Turn on the instrument and use the following table to verify that the readings on each range are within specifications.

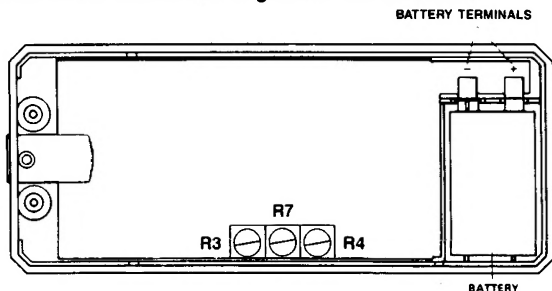
**Table 1. Performance Verification**

Model No.	Range	Reading	Model No.	Range	Reading
HH-25KF	200	$32.0 \pm 1.2^{\circ}\text{F}$	HH-26J	760	$0 \pm 1^{\circ}\text{C}$
	2000	$32 \pm 2^{\circ}\text{F}$		1400	$32 \pm 2^{\circ}\text{F}$
HH-25KC	200	$0.0 \pm 0.5^{\circ}\text{C}$	HH-25TF	200	$32.0 \pm 1.2^{\circ}\text{F}$
	1100	$0 \pm 1^{\circ}\text{C}$		752	$32 \pm 2^{\circ}\text{F}$
HH-26K	1100	$0 \pm 1^{\circ}\text{C}$	HH-25TC	200	$0.0 \pm 0.6^{\circ}\text{C}$
	2000	$32 \pm 2^{\circ}\text{F}$		400	$0 \pm 1^{\circ}\text{C}$

## BATTERY INSTALLATION/REPLACEMENT WARNING

**Turn the instrument off and disconnect the input probe before removing the bottom cover. Reinstall the cover before resuming use of the instrument.**

1. Place the unit face down on a bench or other similar surface and remove the screws from the bottom cover.
2. Separate the bottom cover from the rest of the instrument by grasping the top of the case (just above the display) and carefully lifting it away from the display.
3. Remove the old battery.
4. Place the new battery in the battery compartment. Be sure to observe the proper polarity. Refer to Figure 2.
5. Reinstall the bottom cover before resuming use of the instrument.



**Figure 2. Battery Installation & Trimmer Location**

# CALIBRATION SET-UP & PROCEDURE

## Required Test Equipment

1. DC voltage calibrator with  $\pm 0.05\%$  of setting  $\pm 100\mu\text{V}$  accuracy.
2. 100:1 divider (495 ohm and 5 ohm resistors), 0.02% ratio accuracy or better, wire-wound.
3. Pure-ice bath in Dewar Flask or 1 quart thermos.
4. TC wire terminated with a standard miniature TC plug and a copper wire pair (Refer to Table 2 for appropriate TC wire and connector types).

**Table 2**

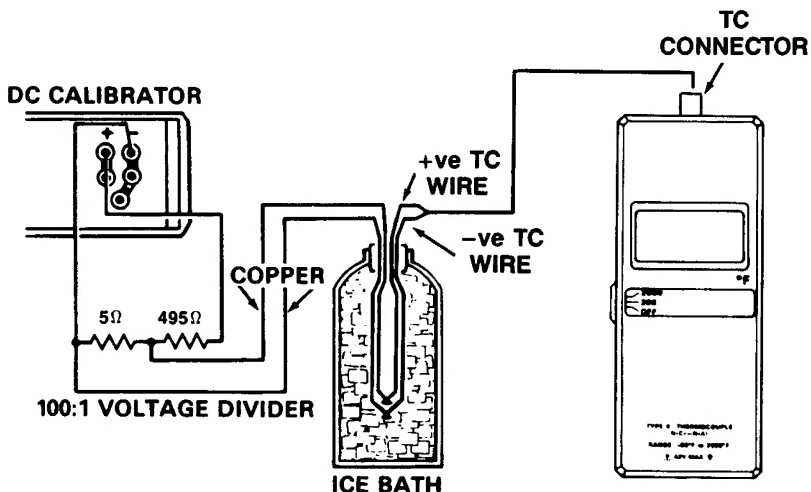
Model	TC Wire Connector Type	Connector Color	+ve TC Wire/Color	-ve TC Wire/Color
HH-25KC	K	Yellow	Chromel—Yellow	Alumel—Red
HH-25KF	K	Yellow	Chromel—Yellow	Alumel—Red
HH-25TC	T	Blue	Copper—Blue	Constantan—Red
HH-25TF	T	Blue	Copper—Blue	Constantan—Red
HH-26K	K	Yellow	Chromel—Yellow	Alumel—Red
HH-26J	J	Black	Iron—White	Constantan—Red

## Calibration Set-Up

1. Turn on the voltage calibrator
2. Connect the TC plug to the instrument's input.
3. Splice the copper wires to the TC wires. Crimp lugs can be used for making the splice.
4. Connect the other ends of the copper wires to the 100:1 divider as shown in figure 3. Observe polarity and TC wire type.
5. Connect the 100:1 divider to the DC voltage calibrator as shown.
6. The instrument should be at an ambient temperature of  $23^{\circ}\text{C} \pm 1^{\circ}\text{C}$  and a relative humidity of less than 20% during calibration.



7. Prepare the pure water ice bath as follows:
- A. Drill a hole in the cap of a Dewar flask or thermos to accommodate the wire junctions.
  - B. Firmly pack the flask with pea-size ice cubs made from distilled water and then fill the flask with distilled water
  - C. Replace melted ice with more ice while removing excess water.
  - D. Place the cap on the flask. Immerse the wire splices into the flask and allow 20 minutes for temperature stabilization.



Instrument and 5Ω resistor must each be at a uniform temperature during calibration.

**Figure 3. Calibration Set-Up**

### **Calibration Procedure**

- 1. Remove the bottom cover of the instrument as described in the disassembly instructions.
- 2. Turn on the instrument and perform the calibration adjustments listed in Table 3.

**Table 3. Calibration Adjustments**

<b>Model Number</b>	<b>Step</b>	<b>Adjustment</b>	<b>Range</b>	<b>Calibrator Setting</b>	<b>Trimmer Adjustment</b>	<b>Desired Reading</b>
HH-25KF	1	Offset	200°F	-69.2 mV	R4	0.6
	2	Reference	2000°F	4057.5 mV	R7	1800
	3	Gain	200°F	243.6 mV	R3	140.0
	4	Check Steps 1-3				
		Readjust Trimmers as required	—	—	—	—
HH-25KC	1	Offset	200°F	3.9 mV	R4	1.0
	2	Reference	1100°F	4048.8 mV	R7	980
	3	Gain	200°F	733.8 mV	R3	180.0
	4	Check Steps 1-3				
		Readjust Trimmers as required	—	—	—	—
HH-25TF	1	Offset	200°F	-65.4 mV	R4	1.0
	2	Reference	752°F	1741.6 mV	R7	650
	3	Gain	200°F	295.8 mV	R3	160.0
	4	Check Steps 1-3				
		Readjust Trimmers as required	—	—	—	—
HH-25TC	1	Offset	200°F	3.9 mV	R4	1.0
	2	Reference	400°F	2086.9 mV	R7	400
	3	Gain	200°F	823.5 mV	R3	180.0
	4	Check Steps 1-3				
		Readjust Trimmers as required	—	—	—	—
HH-26K	1	Offset	°C	0.0 mV	R4	0
	2	Reference (°C)	°C	4048.8 mV	R7	980
	3	Reference (°F)	°F	4057.5 mV	R3	1800
	4	Check Steps 1-3				
		Readjust Trimmers as required	—	—	—	—
HH-26J	1	Offset	°C	0.0 mV	R4	0
	2	Reference (°C)	°C	4292.2 mV	R7	758
	3	Reference (°F)	°F	4292.2 mV	R3	1395
	4	Check Steps 1-3				
		Readjust Trimmers as required	—	—	—	—

\*NOTE: See Figure 2 for Trimmer Location

874-900-01A



## WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. **BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS).** The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available **BEFORE** contacting OMEGA:

1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available **BEFORE** contacting OMEGA:

1. P.O. number to cover the **COST** of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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